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Research Article

Sorafenib and Mesenchymal Stem Cell Therapy: A Promising Approach for Treatment of HCC

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Hepatocellular carcinoma (HCC) is the fifth most commonly diagnosed cancer and the second most common cause of cancer-related death worldwide. Sorafenib (Sora) is used as a targeted therapy for HCC treatment. Mesenchymal stem cells (MSCs) are applied as a new approach to fight malignancies. Drug resistance and side effects are the major concerns with Sora administration. The effect of using the combination of sorafenib and MSCs on tumor regression in xenograft HCC models was evaluated in this study. *Methods and Materials*. Human hepatocellular carcinoma cell lines (HepG2) were subcutaneously implanted into the flank of 18 nude mice. The animals were randomly divided into six groups ($n = 3$); each received Sora (oral), MSCs (IV injection), MSCs (local injection), Sora + MSCs (IV injection), Sora + MSCs (local injection), or no treatment (the control group). Six weeks after tumor implantation, the mice were scarified and tumoral tissues were resected in their entirety. Histopathological and immunohistochemical evaluations were used to measure tumor proliferation and angiogenesis. Apoptotic cells were quantified using the TUNEL assay. *Results*. No significant difference was found in the tumor grade among the treatment groups. Differentiation features of the tumoral cells were histopathologically insignificant in all the groups. Tumor necrosis was highest in the hpMSC (local) + Sora group. Tumor cell proliferation was reduced in hpMSC (local) + Sora-treated and hpMSC (IV) + Sora-treated mice compared with the other groups. Apoptotic-positive cells occupied a greater proportion in the Sora, hpMSC (IV) + Sora, and hpMSC (local) + Sora groups. *Conclusion*. A combination of chemotherapy and MSC can yield to more favorable results in the treatment of HCC.

1. Introduction

HCC is the fifth most common malignant tumor and contributes to about 800,000 deaths globally per annum [1–3]. Only a small fraction of patients with HCC are candidates for curative treatments, such as surgical resection, liver transplantation, or radiofrequency ablation [4]. Although numerous novel strategies have been proposed to treat HCC [5], including cell-based therapies, the disease remains challenging to combat.

Sorafenib is the only FDA-approved drug that is administered as the first line systemic therapy in advanced